

REMARKS

Claims 1-17 and 37-66 constitute the pending claims in the present application, prior to Amendment.

Claims 1, 37, 63 (and claims dependent thereon) have been amended to more particularly point out certain embodiments of Applicants' invention. Claim 1 (and claims dependent thereon) have been amended to clarify that the medicament penetrates the tissue. Applicants' amendment is believed to improve the clarity of the claims. Support for Applicants' amendment can be found, for example, in paragraph [0076] of the published specification. Claims 37, 63 (and claims dependent thereon) have been amended to more particularly point out a distinct step (distinct from a step of supplying ultrasonic energy) of applying a medicament to the wound. Support for Applicants' amendment can be found throughout the specification, for example in the abstract and in the original claims. No new matter has been entered.

Applicants cancel, without prejudice, claims 50-62. Applicants reserve the right to prosecute claims of similar or differing scope in this or future applications.

Applicants add new claims 67-81. Support for the subject matter of the newly added claims is found throughout the specification. Specific support can be found, for example, in the abstract and in the original claims. Additional support for claims 67 and 68 can be found, for example, in paragraphs [0015] and [0076] of the published specification. Additional support for claims 69, 70, 80, and 81 can be found, for example, in paragraph [0074]. Additional support for claim 71 can be found, for example, in paragraphs [0036] and [0070] of the published specification. Additional support for claims 72 and 73 can be found, for example, in paragraphs [0007], [0018], [0043], and [0062] of the published specification. Additional support for claims 74 and 75 can be found, for example, in paragraphs [0015], [0016], [0036], and [0070] of the published specification. Additional support for claims 76-79 can be found, for example, in paragraph [0075] of the published specification. No new matter has been entered

Applicants respectfully request reconsideration in view of the following remarks. Issues raised by the Examiner will be addressed below in the order they appear in the Office Action.

Information Disclosure Statement

Applicants note with appreciation the Examiner's acknowledgement of the references cited in Applicants' Information Disclosure Statements filed April 1, 2004, October 4, 2004, November 12, 2004, February 6, 2006, June 5, 2006, and November 6, 2006.

Applicants take this opportunity to make the Examiner aware of the following co-pending applications: application serial number, 10/409,272; application serial number 10/815,384; and application control number 90/007,613. The co-pending applications name the same inventor as the instant application and are assigned to the same entity as the instant application. Applicants enclose herewith a suitable Information Disclosure Statement form.

Applicants additionally note that an Intent to Issue a Reexamination Certificate has been recently mailed for application control number 90/007,613.

Double Patenting

Claims 1, 7, 9-11, 15-17, 37, 40-42, 47, 48, 50, 53-55, 60, and 61 are rejected on the grounds of obviousness-type double patenting as allegedly unpatentable over claims 1, 2, 4, 5, 7, 8, 13, 14, 16-18, and 21 of U.S. Patent No. 6,478,754. Applicants traverse and ask that this rejection be held in abeyance until indication of allowable subject matter. Applicants will submit a terminal disclaimer, if necessary, upon indication of allowable subject matter.

Claims 1, 9-11, 15-17, 37, 40-42, 47, 48, 50, 53-55, 60, and 61 are rejected on the grounds of obviousness-type double patent as allegedly unpatentable over claims 1, 2-5, 7-10, 12, 13, 16, 17, and 20 of U.S. Patent No. 6,569,099. Applicants traverse and ask that this rejection be held in abeyance until indication of allowable subject matter. Applicants will submit a terminal disclaimer, if necessary, upon indication of allowable subject matter.

Claims 1, 9-11, 15-17, 37, 40-42, 47, 48, 50, 53-55, 60, and 61 are rejected on the grounds of obviousness-type double patenting as allegedly unpatentable over claims 1, 2, 4, 5, 7, 8, 13, 14, 16-18, and 21 of U.S. Patent No. 6,663,554. Applicants traverse and ask that this rejection be held in abeyance until indication of allowable subject matter. Applicants will submit a terminal disclaimer, if necessary, upon indication of allowable subject matter.

35 U.S.C. § 102

Claims 1-4, 7, 9-11, 15, 16, and 63 are rejected under 35 U.S.C. § 102(b) as allegedly anticipated by Gerasimenk (SU 1106485; herein referred to as "Gerasimenk"). Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

The standard for anticipating a claim is clearly outlined in MPEP 2131, and this standard is further supported by the Courts. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1978). "The identical invention must be shown in as complete detail as is contained in the claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Gerasimenk fails to satisfy this criteria, and thus fails to anticipate the claimed invention.

Claim 1 (and claims dependent thereon) is directed to a method " ... wherein the *ultrasonic energy has intensity capable of penetrating the wound tissue to a beneficial depth* to provide a therapeutic effect to the tissue, and of sonicating the medicament *for causing the medicament to penetrate the tissue to a beneficial depth* to provide a therapeutic effect to the tissue." (emphasis added). Claims 1-4, 7, 9-11, 15, and 16 are specifically directed to methods in which both the ultrasonic energy and the medicament penetrate the tissue to a beneficial depth. Gerasimenk fails to teach or suggest these elements of the claimed invention. As such, Gerasimenk fails to anticipate the claimed invention as embodied in, at least, claims 1-4, 7, 9-11, 15, and 16.

Presently rejected claim 63 (and claims dependent thereon) is directed to a method " ... wherein the generated ultrasonic energy has an intensity *capable of penetrating the wound tissue to a beneficial depth* to provide a therapeutic effect for decreasing the healing time for the wound." (emphasis added). Claim 63 is specifically directed to methods in which the ultrasonic energy can penetrate the wound tissue to a beneficial depth. Gerasimenk fails to teach or suggest this element of the claimed invention. As such, Gerasimenk fails to anticipate the claimed invention as embodied in, at least, claim 63.

Applicants contend that the cited abstract of Gerasimenk fails to teach each and every limitation of the claimed invention, and thus fails to anticipate the claimed invention. Additionally, Applicants have reviewed the entire specification of Gerasimenk (a translation of which is enclosed herewith as Exhibit 1) and contend that consideration of the entire disclosure

further supports Applicants' contention that Gerasimenk fails to teach each and every limitation of the claimed invention.

Applicants direct the Examiner's attention to the example (beginning with the sixth complete paragraph in column 1) which provides additional guidance for interpreting the teachings of this reference. Applicants note that in the first step of the example, the medicinal solution is poured into the wound cavity and sonicated by *directly immersing* the waveguide into the solution. As such, the transducer is not used at a non-contact distance from the medicament. Furthermore, after sonication of the medicament, the medicament is specifically removed from the wound cavity using a vacuum.

In a second step, medicament is delivered as an aerosol *through* the transducer. This method is distinct from the claimed method. In the system disclosed by Gerasimenk, liquid (in this case the actual medicament) is delivered through the center of the transducer. In contrast, for embodiments of Applicants' invention in which the relationship between the ultrasonic transducer and the liquid is claimed, the liquid is delivered to the distal end of the transducer. Furthermore, as claimed in embodiments for which Applicants recite a liquid spray used to deliver the ultrasonic energy, the liquid spray is separate from and used in addition to a medicament. Most importantly, this example provides no teaching that the medicament penetrates the wound or other tissue.

In view of, at least, the foregoing arguments, Applicants contend that Gerasimenk fails to anticipate claims 1-4, 7, 9-11, 15, 16, and 63. Nevertheless, to expedite prosecution, Applicants have amended claims 1, 63 (and claims dependent thereon) to more particularly point out certain embodiments of the claimed invention. Specifically, Applicants have amended claim 1 to clarify that the medicament penetrates the tissue to a beneficial depth. Additionally, Applicants have amended claim 63 to clarify that the generated ultrasonic energy penetrates the wound tissue to a beneficial depth, and also to more particularly point out embodiments in which the ultrasonic energy is delivered at a non-contact distance from both the wound and the medicament.

Applicants' amendments to claims 1 and 63 are not in acquiescence to the rejection. Applicants reserve the right to prosecute claims of similar or differing scope. In view of Applicants' arguments and amendments, reconsideration and withdrawal of this rejection are requested.

35 U.S.C. § 103

Claims 37-42, 47, 49-55, 60, 62, and 66 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Gerasimenk in view of Anthony (U.S. Patent No. 4,679,551; herein referred to as "Anthony"). Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

The criteria for establishing a *prima facie* case of obviousness is detailed in MPEP 2142-2143. To establish a *prima facie* case of obviousness, the following three criteria must be met. There must be some suggestion or motivation to modify the reference or to combine reference teachings. There must be a reasonable expectation of success. Finally, the prior art references must teach or suggest each and every limitation of the claimed invention. The combination of Gerasimenk and Anthony fail to satisfy this criteria, and thus fail to undermine the patentability of the claimed invention.

As a first point, Applicants' cancellation of claims 50-62 renders rejection of claims 50-55, 60, and 62 moot.

As a second point, Applicants contend that the teachings of Anthony fail to overcome the deficiencies of Gerasimenk. Anthony teaches a method and device for delivering water or a similar liquid spray to moisten tissue. Anthony does not teach a method and device for promoting wound healing. Anthony does not teach a method and device for delivering ultrasonic energy and a medicament such that the ultrasonic energy and/or the medicament penetrate a wound to a beneficial depth. As such, Applicants contend that the combined teachings of Gerasimenk and Anthony fail to teach or suggest each and every limitation of the claimed invention, and thus fail to undermine the patentability of the claimed invention.

Nevertheless, to expedite prosecution, Applicants have amended claims 37 and 63 (and claims dependent thereon) to more particularly point out a step of applying a medicament to the wound. As such, claims 37-42, 47, 49, and 66 are directed to methods that include both a step of applying a medicament and a step of applying ultrasonic energy through a liquid spray. Gerasimenk and Anthony, considered alone or in combination, fail to teach or suggest methods in which two fluids are used (either consecutively or concurrently). Applicants' amendment is not in acquiescence to the rejection. Applicants reserve the right to prosecute claims of similar or differing scope.

In view of Applicants' amendments, and in view of the rationale describing the deficiencies of Gerasimenk and Anthony with respect to the claims, prior to Amendment, Applicants contend that the combined teachings of Gerasimenk and Anthony fail to render the claimed invention obvious. Reconsideration and withdrawal of this rejection are requested.

Claims 6 and 12-14 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Gerasimenk. Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

The aspects of the invention that are allegedly obvious in view of Gerasimenk do not overcome the deficiencies of Gerasimenk outlined in detail above. Specifically, regardless of whether it would or would not have been obvious to apply the medicament prior to or concurrently with delivery of the ultrasound energy, Gerasimenk still fails to teach or suggest methods by which ultrasonic energy and/or medicament penetrate the wound or tissue to a beneficial effect. As such, Gerasimenk fails to teach or suggest each and every limitation of the claimed invention, and is thus insufficient to render the claimed invention obvious.

Reconsideration and withdrawal of this rejection are requested.

Claim 17 is rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Gerasimenk in view of Duarte (U.S. Patent No. 6,273,864; herein referred to as "Duarte"). Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

The criteria for establishing a *prima facie* case of obviousness is detailed in MPEP 2142-2143. To establish a *prima facie* case of obviousness, the following three criteria must be met. There must be some suggestion or motivation to modify the reference or to combine reference teachings. There must be a reasonable expectation of success. Finally, the prior art references must teach or suggest each and every limitation of the claimed invention. The combination of Gerasimenk and Duarte fail to satisfy this criteria, and thus fail to undermine the patentability of the claimed invention.

Duarte is directed to methods and devices for contact ultrasound. The present invention is directed to methods and devices for promoting wound healing using non-contact ultrasound. As such, Duarte is irrelevant to the presently claimed invention and cannot be used to overcome the deficiencies of Gerasimenk. One of skill in the art would have neither the motivation nor the

reasonable expectation of successfully combining these references to arrive at the claimed invention because of the technical and physiological differences between applying ultrasound via direct contact with tissue (as taught by Duarte *et al.*) and applying ultrasound at a non-contact distance (as taught in the present application). Furthermore, if the Duarte and Gerasimenk references were (inappropriately) combined, the combination still fails to teach each and every limitation of the claimed invention.

Applicants contend that the combined teachings of Gerasimenk and Duarte fail to render claim 17 obvious. One of skill in the art would not have been motivated or have had a reasonable expectation of successfully combining a reference that teaches methods for non-contact ultrasound (arguably Gerasimenk) with a reference that teaches methods for contact ultrasound (Duarte) in an attempt to arrive at the claimed invention for methods of non-contact ultrasound. Reconsideration and withdrawal of this rejection are requested.

Claims 5, 8, 64, and 65 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Gerasimenk in view of Martin (U.S. Patent No: 6,500,133; herein referred to as "Martin"). Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

The criteria for establishing a *prima facie* case of obviousness is detailed in MPEP 2142-2143. To establish a *prima facie* case of obviousness, the following three criteria must be met. There must be some suggestion or motivation to modify the reference or to combine reference teachings. There must be a reasonable expectation of success. Finally, the prior art references must teach or suggest each and every limitation of the claimed invention. The combination of Gerasimenk and Martin fail to satisfy this criteria, and thus fail to undermine the patentability of the claimed invention.

Martin is directed to methods and devices for high intensity ultrasound. A review of Martin indicates that this technology is used, for example, to cauterize tissues during surgery. The use of ultrasound and the identification of appropriate parameters for achieving therapeutic penetration and efficacy for the types of applications taught by Martin are different from both the methods and uses embodied by the present claims and from those disclosed by Gerasimenk. As such, Martin is irrelevant to the presently claimed invention and cannot be used to overcome the deficiencies of Gerasimenk. One of skill in the art would have neither the motivation nor the

reasonable expectation of successfully combining these references to arrive at the claimed invention because of the technical and physiological differences, as well as the differing therapeutic goals and challenges between applying ultrasound in the surgical, cautery context (as taught by Martin) and applying ultrasound at a non-contact distance in the wound cleansing or healing context (as taught in the present application).

Applicants contend that the combined teachings of Gerasimenk and Martin fail to render claims 5, 8, 64, and 65 obvious. One of skill in the art would not have been motivated or have had a reasonable expectation of successfully combining a reference that teaches methods for non-contact ultrasound (arguably Gerasimenk) with a reference that teaches methods for high-intensity ultrasound (Martin) in an attempt to arrive at the claimed invention for methods of promoting wound healing using non-contact ultrasound. Reconsideration and withdrawal of this rejection are requested.

Claims 43-46 and 58-59 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Gerasimenk in view of Anthony and further in view of Martin. Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

Applicants' arguments regarding the deficiencies of the combined teachings of Gerasimenk and Anthony are detailed above. Martin fails to overcome those deficiencies. As such, the combined teachings of Gerasimenk, Anthony, and Martin fail to teach or suggest each and every limitation of the claimed invention, and thus fail to undermine the patentability of the claimed invention. Reconsideration and withdrawal of this rejection are requested.

Claims 48 and 61 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Gerasimenk in view of Anthony and further in view of March (U.S. Patent No. 6,200,259; herein referred to as "March"). Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

Applicants' arguments regarding the deficiencies of the combined teachings of Gerasimenk and Anthony are detailed above. March fails to overcome those deficiencies. As such, the combined teachings of Gerasimenk, Anthony, and March fail to teach or suggest each and every limitation of the claimed invention, and thus fail to undermine the patentability of the claimed invention. Reconsideration and withdrawal of this rejection are requested.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants submit that the pending claims are in condition for allowance. Early and favorable reconsideration is respectfully solicited. The Examiner may address any questions raised by this submission to the undersigned at 617-951-7000.

Please charge any deficiency or credit any overpayment in the fees that may be due in this matter to **Deposit Account No. 18-1945**, from which the undersigned is authorized to draw, under **Order No. 103514-0011-103**.

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(56) 1. Loshchilov V. I. Physical fundamentals of
ultrasonic treatment of infected wounds. Proceedings of
MVTU, No. 242, 1976, pages 27-42.

(54) (57) METHOD FOR TREATMENT OF
INFECTED WOUNDS by exposure of the wound
surface to ultrasound 26.5 ± 0.5 kHz through a medicinal
solution, characterized by the fact that, in order to
shorten the treatment periods, spraying of the medicinal
solution in the form of an aerosol onto the wound
surface is additionally carried out, the diameter of the
particles of which is 30-120 μm , in which case the
aerosol is exposed to ultrasound with a frequency of 20-
100 kHz and an amplitude of 20-40 μm , and exposure is
carried out at a distance of 3-10 mm for 1-5 minutes.

(09) SU (11) 1106485 A

Exhibit 1

1106485

1

The invention pertains to medicine, and specifically to therapeutic methods for treatment of infected wounds.

A method is known for treatment of infected wounds, which consists of sonication through a medicinal solution of the wound surface with a frequency of 26.5 kHz [1].

A shortcoming of the method is the long duration of treatment.

The objective of the invention is to shorten the treatment periods of infected wounds.

The objective is achieved in that, according to the method for treatment of infected wounds by exposure of the wound surface to ultrasound 26.5 ± 0.5 kHz through a medicinal solution, spraying of the medicinal solution is additionally carried out on the wound surface in the form of an aerosol, the diameter of whose particles is 30–120 μm , in which the aerosol is sonicated with ultrasound with a frequency of 20–100 kHz and an amplitude of 20–40 μm , and exposure is carried out at a distance of 3–10 mm for 1–5 minutes.

Example 1. A 38-year-old patient with recurring adenoma of the ceruminous glands, skin of the external auditory canal. Operation: electroexcision of the recurring tumor of the external auditory canal, resection of the left parotid gland. In the postoperative period, suppuration of the wound developed (area of the wound 2 \times 6 cm).

The patient was placed on a surgical chair. The patient's head was oriented, so that the wound surface was positioned horizontally. Five mL of medicinal solution was poured into the wound cavity (furacillin 1:5000). The waveguide was immersed in the medicinal solution and the wound surface sonicated with a frequency of 26.5 ± 0.5 kHz. The wound surface was cleaned of necrotic tissue. The spent medicinal solution was removed from the wound cavity using vacuum suction.

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The head of the patient was positioned in the normal vertical position. The acoustic unit was engaged with a resonance frequency of 20 kHz, having an axial through opening. A solution of furacillin 1:5000 was passed through the axial hole of the acoustic unit. The acoustic unit was tuned to an amplitude of 20 μm . From the end of the acoustic unit, an aerosol plume detached, consisting of particles of aerosol 30 μm in diameter. The acoustic unit was moved over the entire surface of the wound uniformly for one minute, thus spraying the sonicated furacillin solution onto the wound surface.

Among the processes occurring in ultrasonic treatment of a wound surface, those of the greatest significance are cleaning of the wound, introduction of the medicinal solution, and suppression of bacterial microflora.

The antibacterial activity of the aqueous solution of antiseptics is increased during the formation of an aerosol plume, since the cavitation occurring in the layer of solution on the working end of the acoustic unit leads to formation of free radicals H, OH, HO₂ in the solution, which possess high antibacterial activity. For this reason, ultrasonic spraying onto the wound surface of a furacillin solution intensifies suppression of bacterial microflora.

The procedure of ultrasonic treatment according to the proposed method is repeated daily for seven days.

Use of the proposed method shortens the residence time of the patients in the clinic by 3–9 days in comparison with treatment by traditional methods. Moreover, the cost of treatment is reduced, since treatment is carried out using relatively inexpensive antiseptic solutions, the threat of an allergic reaction is ruled out, which is possible when antibiotics are used.

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